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## NOTE ON POLYNESIAN AND EAST INDIAN PUPIDÆ.

BY HENRY A. PILSBRY.

Inquiries bearing on the origin and affinities of the land snails of Polynesia caused me to investigate the Pupa groups of the region. The chief work upon them is that of Boettger, who gives in the second volume of Prof. von Martens' *Conchologische Mittheilungen* a review of the species, illustrating those known to him by specimens. Several later papers by the same industrious author have appeared in the *Berichte der Senckenbergische Gesellschaft*, dealing with East Indian forms. The general grouping adopted by Boettger seems to be supported in the main by my own observations; but a few minor points may require revision. In referring East Indian forms to the Madeiran group *Staurodon* of Lowe, it seems to me that a mere analogy has been given undue weight. The form and structure of the angle tubercle—for it can hardly be called a “*lamella angularis*”—is quite different in the Madeiran *Staurodon saxicola* and the Oriental so-called *Staurodon* species. In the latter it has the form of that in the group I call *Nesopupa*,<sup>1</sup> only much shortened. I would therefore remove *Staurodon* from the nomenclature of Oriental *Pupidæ*.

We have, then, four groups remaining, as follows:

1. *Bifidaria* Sterki. The characters and synonymy of this genus have been discussed in my paper on Australian *Pupidæ*, and will be more fully considered in that by Mr. Vanatta and myself on the American forms.

The species of the area under discussion are widely distributed over Polynesia, except the Sandwich group, the single species *B. pediculus* Shuttlw. having a tremendous range, probably in part owing to human transporting agencies. There are several other closely allied forms, such as *B. pfeifferi* Bttg. and *B. recondita* T.-C., of more limited range, all of them allied to Australian

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<sup>1</sup>I am aware that this name is of mixed parentage, but a mongrel in this case may be more convenient than a thoroughbred.

forms. The smooth surface, white teeth, and more or less united angle and parietal lamellæ readily separate this type from *Nesopupa*.

2. *Cylindrovertilla* Boettger. So far as known, confined to New Caledonia, where there are two species, and eastern Australia, one species. It therefore scarcely enters the region we are considering.

3. *Costigo* Boettger.<sup>2</sup> This group resembles *Nesopupa* in the dull brown, costulate or striate surface. It differs in having no angle lamella, only a simple parietal on the parietal wall, a columellar always present, palatals two or none. It is probably a *Nesopupa*, in which the angle lamella has become obsolete. Distribution, Saparua Island and Philippines.

4. *Nesopupa* Pils.<sup>3</sup> Small, dark brown, opaque and lustreless; ribbed, costulate or striate; the aperture armed with an angle lamella and a parietal, which remain distinct, not uniting as in *Bifidaria*; columellar lamella and palatal folds as usual, the latter rarely absent; lip expanded. Type *N. tantilla* Gld.

This is *par excellence* the Polynesian type of *Pupa*. It is absent in Australia, but occurs in the Philippines, Borneo, etc., and also in Mauritius and Mayotte. A number of sections may perhaps eventually be distinguished, but only one seems to me to have any foundation in nature. This may be defined thus:

*Nesopupa* ss. Peristome discontinuous above; palatal folds of moderate length.

*Lyropupa* n. sect. Peristome continuous; upper palatal fold very long; shell strongly costate. Type *N. lyrata* Gld.

The section *Lyropupa* contains several Hawaiian species, *lyrata* Gld., *perlonga* Pse., *costata* Pse.<sup>4</sup>

Typical *Nesopupa* includes *tantilla* Gld. with the numerous forms recognized as varieties by Boettger (*l. c.*), *eapensis* Bttg., and

<sup>2</sup> *Bericht Senckenb. Naturforsch. Ges.*, 1891, p. 270. Type *Vertigo (Costigo) saparuana* Bttg.

<sup>3</sup> The following are synonyms:

*Pagodella* H. Ad., *P. Z. S.*, 1867, p. 304. Type *Pupa (Pagodella) ventricosa* H. Ad. (Mauritius). Not *Pagodella* Swainson, 1840.

*Ptychochilus* Boettger. *Conch. Mittheil.*, II, p. 47, 1881. Type *P. tantilla* Gld. (Polynesia). Not *Ptychocheilus* Agas., *Pisces*, 1855.

*Staurodon* Bttg., olim, for *minutalis* Morel., *moreleti* A. D. B. Not of Lowe, 1852.

<sup>4</sup> *Vertigo cubana* Dall, *Proc. U. S. Nat. Mus.* XIII, 1890, pp. 1, 2, f. 1, 2, is identical with *costata* Pease. My friend was naturally misled by the false locality, "Cuba," of his specimen. The figures are excellent.

the Hawaiian forms, *newcombi*, *admodesta*, *parva*, which have the angle lamella shorter. The Philippine forms referred to *Staurodon* also belong here, *moreleti* A. D. Brown, *quadrasi* Mlldff. (Guam), etc., and likewise *minutalis* Morel. (Mayotte), *ventricosa* H. Ad. (Mauritius), and *incerta* Nevill. (Bourbon). The forms with a short angle lamella are probably not closely allied to each other, but nearer the species with a long angle lamella, occurring in their respective regions.